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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,185	02/12/2001	Helen H. Zhu	LAMIP147/P0675	5391

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EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 02/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Applicati n No. 09/782,185	Applicant(s) ZHU ET AL.	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 15-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u> . | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-14, drawn to an etching method, classified in class 438, subclass 706.
  - II. Claim 15-18, drawn to a product, classified in class 257, subclass 506.
2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by another and materially different process such as dry etching with chlorine-containing etchant.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
3. During a telephone conversation with Michael Lee on February 19, 2002 a provisional election was made without traverse to prosecute the invention of group I,

claims 1-14. Affirmation of this election must be made by applicant in replying to this Office action. Claims 15-18 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

#### ***Specification***

5. The specification is objected. The attempt to incorporate subject matter into this application by reference to U.S. Application No. 09/782,678, 09/782,446, and 09/782,437 is improper because they are not allowed applications.

#### ***Claim Rejections - 35 USC § 112***

6. Claims 3, 5, and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 is indefinite for use of improper language. The examiner suggests replacing "a group" with -- the group --.

Claims 5 and 7 contain the trademark/trade name SiLK. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe an organic dielectric material and, accordingly, the identification/description is indefinite.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --(e) the invention was described in-  
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or  
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

8. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Tao et al. (US 6,194,128 B1).

Tao teaches a method for etching a feature in an integrated circuit wafer, the wafer incorporating at least one low-k dielectric layer (col. 3, lines 20-24). Tao teaches that the wafer may be disposed within a reaction chamber. A flow of fluorocarbon-containing etchant gas may be introduced into the reaction chamber (col. 7, lines 57-61). A plasma may be formed from the etchant gas within the reaction chamber and the feature with at least a portion of the low-k dielectric layer may be etched (so-called etching the layer of low dielectric constant is performed in the MERIE in Tao, see col. 7, lines 57-58; col. 6, lines 25-28).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao et al. (US 6,194,128 B1) in view of Ye et al. (US 6,080,529).

Tao teaches a method for etching a feature in an integrated circuit wafer, the wafer incorporating at least one low-k dielectric layer (col. 3, lines 20-24). Tao teaches that the wafer may be disposed within a reaction chamber. A flow of fluorocarbon-

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containing etchant gas may be introduced into the reaction chamber (col. 7, lines 57-61). A plasma may be formed from the etchant gas within the reaction chamber and the feature with at least a portion of the low-k dielectric layer may be etched (so-called etching the layer of low dielectric constant is performed in the MERIE in Tao, see col. 7, lines 57-58; col. 6, lines 25-28).

As to dependent claim 2, Tao is not particular about the low-k dielectric layer used in his process, therefore, it would be obvious to one skilled in the art to use an organic low-k dielectric layer because it is one of the well-known, most popular low-k dielectric layer in the art of semiconductor device fabrication. Ye is relied on to show this well-known feature (see col. 1, line 20). Hence, it would have been obvious to one with ordinary skill in the art to modify Tao by using this well-known organic low-k dielectric layer in order to provide their art recognized advantages and thus produce an expected result.

As to dependent claim 3, Tao teaches the fluorocarbon such as  $\text{CHF}_3$  or  $\text{CH}_3\text{F}$ , see col. 7, line 58.

As to dependent claim 4, Tao teaches the additives such as oxygen or nitrogen, see col.7, line 58.

As to dependent claims 5 and 7, Ye teaches that the organic dielectric layer may be made of SILK (col. 23, line 7). It is one of the well-known organic low-k dielectric layer. Hence, it would have been obvious to one with ordinary skill in the art to modify Tao by using this well-known organic low-k dielectric layer in order to provide their art recognized advantages and thus produce an expected result.

As to dependent claim 6, Tao teaches that the flow rate of fluorocarbon may be 5 to 15 sccm (col. 7, line 61), which is within the range cited.

As to dependent claims 8 and 9, Tao teaches that the fluorocarbon-containing etchant gas may comprise  $\text{CH}_3\text{F}$  and nitrogen (col. 7, line 58). Unlike the claimed invention, Tao does not teach that hydrogen (instant claim 8) and  $\text{NH}_3$  (instant claim 9) may be included. Ye teaches that the hydrogen/ nitrogen based plasma (such as ammonia; or hydrogen and nitrogen) is especially useful for etching organic low-k dielectric in a multiplayer substrate (col. 6, lines 23-27 and 65; col. 7, lines 14-15). Hence, it would have been obvious to one with ordinary skill in the art to modify Tao by including hydrogen and / or ammonia plasma as taught by Ye because Ye teaches that it is especially useful for etching organic low-k dielectric in a multiplayer substrate.

As to dependent claim 10, Tao teaches that the fluorocarbon-containing etchant gas may comprise  $\text{CH}_3\text{F}$  gas,  $\text{O}_2$  gas and  $\text{N}_2$  gas (col. 7, line 58).

As to dependent claim 11, Tao teaches that the flow rate of fluorocarbon may be 5 to 15 sccm (col. 7, line 61), which is within the range cited.

As to dependent claims 12 and 13, Tao teaches that the fluorocarbon-containing etchant gas may comprise  $\text{CH}_3\text{F}$  and nitrogen (col. 7, line 58). Unlike the claimed invention, Tao does not teach that hydrogen (instant claim 12) and  $\text{NH}_3$  (instant claim 13) may be included. Ye teaches that the hydrogen/ nitrogen based plasma (such as ammonia; or hydrogen and nitrogen) is especially useful for etching organic low-k dielectric in a multiplayer substrate (col. 6, lines 23-27 and 65; col. 7, lines 14-15). Hence, it would have been obvious to one with ordinary skill in the art to modify Tao by



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including hydrogen and / or ammonia plasma as taught by Ye because Ye teaches that it is especially useful for etching organic low-k dielectric in a multiplayer substrate.

As to dependent claim 14, Tao teaches that the fluorocarbon-containing etchant gas may comprise  $\text{CH}_3\text{F}$  gas,  $\text{O}_2$  gas and  $\text{N}_2$  gas (col. 7, line 58).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-5408 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.

K-C C  
February 20, 2002

*Kin-Chan CHEN*  
Patent Examiner  
Group Art Unit 1765